



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,304	07/14/2006	Yoshito Ishii	1204.46402X00	2523

20457 7590 09/09/2009
ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-3873

EXAMINER

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
----------	--------------

1795

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

09/09/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dlee@antonelli.com
rrodriguez@antonelli.com
lthenor@antonelli.com

Office Action Summary	Application No. 10/586,304	Applicant(s) ISHII ET AL.	
	Examiner Gregg Cantelmo	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 6-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/14/06; 1/26/07; 6/25/09</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Preliminary Amendment

1. The preliminary amendment received July 14, 2006 has been entered.
Claims 1-5 have been cancelled as per Applicant's request. Claims 6-20 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statements filed July 14, 2006; January 26, 2007 and June 25, 2009 have been placed in the application file and the information referred to therein has been considered as to the merits. Note that all of the citations in the IDS filed January 26, 2007 were previously cited in the IDS filed July 14, 2006. The references have been considered but duplicate citations have been lined through in the latter filed IDS.

Drawings

4. The drawings received July 14, 2006 are acceptable for examination purposes.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Art Unit: 1795

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 6 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,444,365 (Ishii).

Ishii discloses a negative electrode including a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter in a range from 1-100 microns (col. 4, ll. 34-35), a crystallite size $L_c(002)$ in a C-axis direction of at least 500 Angstroms (col. 5, ll. 40-54), a BET at most $8 \text{ m}^2/\text{g}$ (col. 5, ll. 20-37) and an aspect ratio of 5 or less (abstract). The values for (002) and (110) are such that the ratio of (002)/(110) is at most 500 (see col. 5, ll. 40-54 as applied to claim 6).

The electrode is used in a lithium battery (title as applied to claim 13).

6. Claims 6-20 are rejected under 35 U.S.C. 102(a) as being anticipated by JP 2004-055139 (Ishii).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Ishii discloses a negative electrode including a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter in a range from 1-100 microns (para. 11), a crystallite size $L_c(002)$ in a C-axis direction of at least 500 Angstroms (para. 8), a BET at most $8 \text{ m}^2/\text{g}$ (para. 12) and an aspect ratio from 5 to 1.2 (para 10). The ratio of (002)/(110) is at most 500 (see para. 5 as applied to claim 6).

The density is $1.5\text{-}1.9 \text{ g/cm}^3$ (para. 7 as applied to claim 7).

The primary particles above are aggregated to form secondary particles with the primary particles have a size in the range of 1-100 microns and an aspect ratio of 100 or less (para. 11 as applied to claim 8).

The graphite powder is ground and thus mechanically modified (para. 18 as applied to claim 9).

The method includes blending a graphitizable aggregate or graphite and a graphitizable binder and grinding them. The pulverized mixture is then combined with a graphitizing catalyst (from 1-50% by weight) and sintering. A binder and solvent are added to the mixture and blended with the mixture being formed on a current collector then dried to remove the solvent and pressurizing the coated collector (para. 13 as applied to claim 10). The aggregate used has a diameter from 1-80 microns and an aspect ratio from 1.2-500 (para. 13 as applied to claim 10).

Ishii discloses a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter in a range from 1-100 microns (para. 11), a crystallite size $L_c(002)$ in a C-axis direction of at least 500 Angstroms (para. 8), a BET at most $8 \text{ m}^2/\text{g}$ (para. 12) and an aspect ratio from 5 to 1.2 (para 10). The ratio of $(002)/(110)$ is at most 500 (see para. 5). The primary particles above are aggregated to form secondary particles with the primary particles have a size in the range of 1-100 microns and an aspect ratio of 100 or less (para. 11 as applied to claim 11).

Ishii discloses a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter in a range from 1-100 microns (para. 11), a crystallite size $L_c(002)$ in a C-axis direction of at least 500 Angstroms (para. 8), a

Art Unit: 1795

BET at most $8 \text{ m}^2/\text{g}$ (para. 12) and an aspect ratio from 5 to 1.2 (para 10). The ratio of (002)/(110) is at most 500 (see para. 5). The primary particles above are aggregated to form secondary particles with the primary particles have a size in the range of 1-100 microns and an aspect ratio of 100 or less (para. 11). The density is $1.5\text{-}1.9 \text{ g/cm}^3$ (para. 7 as applied to claim 12).

Ishii teaches further of a lithium secondary battery comprising a negative electrode as recited in claim 6 and a positive electrode containing lithium compound (paras. 22-24 as applied to claim 13).

Ishii teaches further of a lithium secondary battery comprising a negative electrode as recited in claim 10 and a positive electrode containing lithium compound (paras. 22-24 as applied to claim 14).

The graphite powder is used in the negative electrode in a lithium battery (as applied to claim 15).

The secondary battery comprises the graphite powder of claim 12 as discussed above and a positive electrode containing a lithium compound (as applied to claim 19).

The lithium compound can include nickel (para. 23 as applied to claim 16-18 and 20).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 6, 7, 9, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2001-283844 (Shoji) in view of U.S. Patent No. 6,344,296 (Ishii-296).

Shoji discloses a negative electrode including a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter of 20 microns (para. 15), a crystallite size $L_c(002)$ in a C-axis direction of 780 Angstroms (para. 15), and where the ratio of $(002)/(110)$ is at most 500 (see para. 15 as applied to claim 6).

Art Unit: 1795

The density is 1.5-1.9 g/cm³ (prior art claim 3 as applied to claim 7).

The graphite powder is ground and thus mechanically modified (para. 15 as applied to claim 9).

Shoji teaches further of a lithium secondary battery comprising a negative electrode as recited in claim 6 and a positive electrode containing lithium compound (as applied to claim 13).

The lithium compound can include nickel (para. 18 as applied to claim 16).

Shoji does not teach of the graphite having an aspect ratio of 5 or less or a BET of 8 m²/g or less.

Regarding the claimed aspect ratio:

Ishi-296 teaches of controlling the aspect ratio of graphite particles to 5 or less. The aspect ratio is preferably in the range of from 1.2 to 5. When the aspect ratio is smaller than 1.2, contact area between particles decreases, due to which conductivity decreases. For the same reason as above, a more preferable range of aspect ratio is 1.3 or more (col. 4, ll. 61-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Shoji by controlling the aspect ratio of graphite particles to 5 or less as taught by Ishii-296 since it would have enhanced the conductivity of the graphite material and improve the charge/discharge characteristics.

Regarding the claimed BET:

The third graphite particle of this invention is a graphite particle having a specific surface area of $8 \text{ m}^2/\text{g}$ or less. The specific area is preferably $5 \text{ m}^2/\text{g}$ or less, more preferably $1.5\text{-}5 \text{ m}^2/\text{g}$, and further preferably $2\text{-}5 \text{ m}^2/\text{g}$. By using such a graphite particle as a negative electrode, the rapid charge-discharge characteristics and cycle characteristics of the lithium secondary battery obtained therefrom can be improved, and the irreversible capacity in the first cycle can be decreased. If the specific surface area is greater than $8 \text{ m}^2/\text{g}$, the irreversible capacity of the first cycle of the lithium secondary battery obtained therefrom is high and the energy density is low, and further there is a problem that the preparation of negative electrode requires to use a large quantity of binder. On the other hand, if, the specific surface area is smaller than $1.5 \text{ m}^2/\text{g}$, the rapid charge-discharge characteristics and cycle characteristics of the lithium secondary battery obtained therefrom tend to be deteriorated. The specific surface area can be measured by known methods such as BET method (nitrogen gas adsorption method) or the like. (col. 5, ll. 14-33).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Shoji by controlling the BET to be $8 \text{ m}^2/\text{g}$ or less as taught by Ishii-296 since it would have improved the rapid charge-discharge characteristics and cycle characteristics of the lithium secondary battery obtained and would have decreased the irreversible capacity in the first cycle.

9. Claim 6-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii-296 in view of Shoji.

Ishii-296 discloses a negative electrode including a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter in a range from 1-100 microns (col. 7, ll. 26-29), a crystallite size $L_c(002)$ in a C-axis direction of at least 500 Angstroms (col. 7, ll. 7-15), a BET at most $8 \text{ m}^2/\text{g}$ (col. 5, ll. 14-34) and an aspect ratio from 5 to 1.2 (col. 4, ll. 60-65).

The density is $1.5\text{-}1.9 \text{ g/cm}^3$ (col. 9, ll. 32-47 as applied to claim 7).

The primary particles above are aggregated to form secondary particles with the primary particles have a size in the range of 1-100 microns and an aspect ratio of 100 or less (col. 7, line 26 through col. 8, line 26 as applied to claim 8).

The graphite powder is ground and thus mechanically modified (col. 8, ll. 1-53 as applied to claim 9).

The method includes blending a graphitizable aggregate or graphite and a graphitizable binder and grinding them (col. 8, ll. 19-22). The pulverized mixture is then combined with a graphitizing catalyst (from 1-50% by weight) and sintered (col. 7, line. 26 through col. 8, line 38). A binder and solvent are added to the mixture and blended with the mixture being formed on a current collector then dried to remove the solvent and pressurizing the coated collector (col. 8, line 55 through col. 9, line 25, col. 9, line 66 3through col. 10, line 4 as applied to claim 10). The aggregate used has a diameter from 1-80 microns (col. 8, ll. 46-54) and an aspect ratio from 1.2-500 (col. 4, line 56 through col. 5, line 3 as applied to claim 10).

Ishii-296 discloses a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter in a range from 1-100

Art Unit: 1795

microns (col. 7, ll. 26-29), a crystallite size $L_c(002)$ in a C-axis direction of at least 500 Angstroms (col. 7, ll. 7-15), a BET at most $8 \text{ m}^2/\text{g}$ (col. 5, ll. 14-34) and an aspect ratio from 5 to 1.2 (col. 4, ll. 60-65). The primary particles above are aggregated to form secondary particles with the primary particles have a size in the range of 1-100 microns and an aspect ratio of 100 or less (col. 8, ll. 19-54 and col. 4, ll. 60-65 as applied to claim 11).

Ishii-296 discloses a graphite material and a binder (abstract). The graphite material includes particles having a mean particle diameter in a range from 1-100 microns (col. 7, ll. 26-29), a crystallite size $L_c(002)$ in a C-axis direction of at least 500 Angstroms (col. 7, ll. 7-15), a BET at most $8 \text{ m}^2/\text{g}$ col. 5, ll. 14-34) and an aspect ratio from 5 to 1.2 (col. 4, ll. 60-65). The primary particles above are aggregated to form secondary particles with the primary particles have a size in the range of 1-100 microns and an aspect ratio of 100 or less (col. 8, ll. 19-54 and col. 4, ll. 60-65). The density is $1.5\text{-}1.9 \text{ g/cm}^3$ (col. 9, ll. 32-47 as applied to claim 12).

Ishii-296 teaches further of a lithium secondary battery comprising a negative electrode as recited in claim 6 and a positive electrode containing lithium compound (see examples as applied to claim 13).

Ishii-296 teaches further of a lithium secondary battery comprising a negative electrode as recited in claim 10 and a positive electrode containing lithium compound (see examples as applied to claim 14).

The graphite powder is used in the negative electrode in a lithium battery (see examples as applied to claim 15).

The secondary battery comprises the graphite powder of claim 12 as discussed above and a positive electrode containing a lithium compound (see examples as applied to claim 19).

The lithium compound can include nickel (col. 11, ll. 1-4 as applied to claim 16-18 and 20).

The difference between claims 6-20 and Ishii-296 is that Ishii-296 does not teach of the claimed diffraction intensity ratio $(002)/(110)$ being at most 500.

Shoji teaches of controlling the diffraction intensity ratio $(002)/(110)$ to be at most 1000 and further teaches of 500 and 300 ratios (see table 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Ishii-296 by controlling the diffraction intensity ratio $(002)/(110)$ to be at most 1000 and further teaches of 500 and 300 ratios as taught by Shoji since it would have improved the adhesion and capacity of the electrode active material.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Gregg Cantelmo/
Primary Examiner, Art Unit 1795